

# EXHIBIT S

**MURRAY BURNSTINE P.E.**  
**67 MAPLEWOOD STREET**  
**MALDEN, MASSACHUSETTS 02148**  
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16 November 2006

Brown v United States, et al., C.A.No 04-11924-RGS

Pre trial report of Murray Burnstine

My first notification and request to investigate the subject incident was through a phone conference with Mr. Scott Charnas on 15 April 2002. I was faxed the Bedford PD report. A preliminary survey of the scene and inspection of the motorcycle was performed on 17 April 2002.

Brown was heading NE on Hartwell Road (the directions are by survey compass and might differ from local terminology). Hartwell road is 33 feet wide. The pavement edges are irregular, the NE lane is 17 feet wide, there are no curbs. My survey began upstream of the collision at pole No. 39 (sta. 0). The road side edge of pole 39 was 7'-6" from the pavement. A beam type guardrail starts just N of pole 39. Pole 38 (sta 61'-7") has a "SPEED LIMIT 25" sign and is 2'-3" inboard of the edge of the pavement and located between the guardrail and the pavement. The road surface was well worn black top and the coefficient of friction was assessed at 0.6. The grade of the road at various locations was recorded in my notes. At station 67'-10" in the northbound lane there was a collapsed sewer manhole. The cast iron cover was 26" in diameter, the zone of collapse surrounding the cover measured 55" in diameter and the depth of the collapse measured 2" below the adjacent pavement. The center of the manhole was 104 feet upstream of pole 37 (the one struck).

Pole 37 (sta 172') near side was 13 inches from the pavement edge. The guardrail was behind the pole. The guardrail ends at sta 260' and the survey ends at pole 36 (sta 279'). The road within the survey zone is in a constant left turn with a centerline radius of 224 feet.

The scene was located using the pole number (37) on the police report. With respect to Browns travel direction: on his right was Hanscom Field and on his left was the former Raytheon Missile Systems complex (180 Hartwell Ave). Several discrepancies were noted on the Bedford PD report: i.e. with respect to the motorcycle travel direction the pole numbers are decreasing (39---36) not increasing as shown in the police sketch and the poles should be shown between the road and the guardrail. There

was construction equipment in the road about 500 feet North of the scene but there were no signs of recent alterations within the survey zone.

The motorcycle was inspected and photographed at 129 Independence Court, Bedford. It was covered by an elastic edged motorcycle cover. The unit was a Kawasaki Ninja model Z//12R. The vehicle identification number was JKAZX1A028604. The date of final assembly was December 2000. The tire pressures were front 36 psi/rear 42 psi. The ambient temperature was 80F. There were no fluid leaks or upright impact damage. The unit had slid along the pavement on its right side. The fiberglass cowling was scratched and the right hand muffler support was fractured. An ignition key was not available and the electronic odometer could not be activated. The throttle return was positive and the front and rear brakes worked properly.

I returned to the scene on 24 April 2002 to complete my survey and detail photography. There were no alterations to the poles, guardrails or pavement edges but the center of the road had been dug up and the sewer manhole and defect were gone. Detailed measurements were taken around pole 37; wood samples were taken from pole 37 to compare to witness marks on the helmet reported by the police.

On 23 September 2002 Mr. Charnas brought to my office bags of clothing and a helmet for inspection and photography. The helmet was structurally intact-there was some flaking of the paint and plastic and a brown streak at the top running from front to back. Camo pants/military issue cut open by scissors. Joe Rocket Ballistic black jacket right shoulder and arm abraded/front has been cut by scissors. Black T shirt cut by scissors/no marks. Two leather reflectorized gloves/no marks. Black riding pants/right hip area and right front abraded/weave has melted/no pavement or sand in damaged zone probably through contact with steel guard rail. Right boot has abrasion marks right side, debris/grass and sand caught between sole and toe. On 14 November 2003, the helmet and wood samples were delivered to Mr. Charnas. On 27 June 2006, the clothing was delivered to Mr. Charnas.

## OPINIONS

The depressed manhole was the the most probable cause of Brown losing directional control of the motorcycle. He either didn't see it and ran into the hole or he saw it and tried to pass between the defect and the pole. A motorcycle is steered by leaning, to facilitate this the tires have a smooth tread and a more rounded footprint to the road. In a leaning to the right and crouched position I would expect the top of his helmet to strike pole 37 without lower parts of the rider or cycle being involved.

The pole is on the wrong side of the road: A safer location would have been on the inside of the curve.

The guard rail is on the wrong side of the pole. The purpose of the guardrail is to deflect vehicles away from the pole.

The horizontal sections of the guardrail are improperly lapped the exposed ends are facing traffic.

Pole 37 was too close to the pavement.

There were no mechanical defects on the motorcycle.

The weather was not a factor in the loss of control.

The helmet to pole impact speed was in the range 20-25 MPH based on the distance the motorcycle slid after impact. I can not determine the pre impact speed. At 25 MPH the time to travel from the center of the manhole to pole 37 (104 feet) would be 2.8 seconds.

At 2:19 PM on 04 January 2002 the weather conditions at the Bedford airport were: visibility 10 miles, wind direction West 8.1 MPH, temp was 33.1 F.

The described dangerous conditions at the scene observed, photographed, and measured on 17 April 2002 were substantially unchanged since 4 January 2002.

#### BASIS OF OPINIONS

My opinions are based on my education, training, and experience as an automotive engineer over the last 54 years: inspections, photos and my field notes regarding the scene and the motorcycle, recalls, service bulletins, the helmet, clothing, and the weather history for the Bedford airport on 4 January 2002, scholarly papers concerned with motorcycle dynamics, pole and guardrail placement, and road defects. The Ian Brown depositions of 7 and 14 July 2006 and the attached exhibits. The Bedford police report and their photos of the scene and the motorcycle. The deposition and exhibits of officer Tracey Cook. Photographs produced in discovery.

The distance from pole 37 to the final position of the riderless motorcycle was measured by police to be 89 feet. I assumed the motorcycle was sliding on the right side plastic fairing for this distance. The superficial scratches to the plastic and the absence of gouges in the pavement tend to indicate a coefficient of friction of 0.2, or less (a braked tire on the same road would exert a coefficient of 0.6 on a dry road and 0.3 on wet road.) The standard slide to stop physics equations were used and the results were an initial (when the motorcycle fell over and began to slide) velocity of 24 MPH for a level road. When the downhill grade of the road was factored in the initial velocity was calculated to be 20 MPH. The police scene photos depict a travel path off the road and parallel to the guard rail of an upright motorcycle. The trail ends at or slightly before pole 37. In the Cook deposition this mark is referred to as a skid mark but it

does not have any of the locked wheel characteristic marks. At the moment of Browns impact with the pole he was either leaning to his right and fully or partially on the motorcycle or he had separated from the motorcycle completely. There is no evidence that the motorcycle contacted either the guardrail or the pole.

The hourly weather history for the bedford airport (BED) for friday January 4, 2002 was obtained at [www.underground.com/history/airport/BED/2002/1/4/daily....](http://www.underground.com/history/airport/BED/2002/1/4/daily....) It was also obtained for Logan airport (KBOS)

The slide to stop equation used was  $S = V^2 / 2gf$

S = distance in feet

V = velocity in feet per second

g is the acceleration due to gravity (32.2 fps/s)

f is the coefficient of friction assumed

the answer in feet per second was converted to miles per hour by dividing by 1.46

some of the scholarly papers referred to were:

Society of Automotive engineers collected papers SP-428 "Motorcycle dynamics and Rider Control"

US Federal Highway Administration HNG-10  
"Design considerations for existing utility poles in urban areas"  
National Technical Information Service

"Motorcycle Accident cause factors and identification of countermeasures"  
Battelle Memorial Institute

"Effects of presence of light poles on vehicle impact of roadside barriers"  
USDOT:NHTSA "National agenda for motorcycle safety"

Northwestern University  
"The traffic investigators manual"

My qualifications are set forth in the attached resume'  
My testimony for the required period is on pages 28-29 of my trial list.  
My rate of compensation is \$150 per hour

  
Murray Burnstine

RESUME'  
MURRAY BURNSTINE

RESIDENCE

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Melrose, Mass. 02176  
Telephone (781) 979-0741

OFFICE

67 Maplewood Street  
Malden, Mass. 02148  
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Murraysax@aol.com

EDUCATION

McCulloch Elementary Detroit Michigan  
Durfee Intermediate Detroit  
Central High School Detroit  
Wayne University, Detroit B.S. Mechanical Engineering  
(Automotive specialty) 1953  
U.S.A.F. Communications Officers School-Scott Field  
Illinois 1953  
U.S.A.F. Reserve Officer courses in Aircraft  
Maintenance Detroit Michigan 1953-1960  
University of Michigan Graduate school courses in  
Engineering Mechanics, Ann Arbor Michigan 1958  
Wayne State University, Detroit M.S. Engineering  
Mechanics (Biomechanics Specialty) 1960  
Purdue University Arson Investigators Seminar, 1962  
U.S.A.F Courses in Nuclear Defense 1962-1963  
Emergency Vehicle operation course, California  
Highway Patrol Academy, Sacramento, Cal. 1962

MILITARY

Direct Commision 2/Lt. USAF January 1953  
Officers Basic Military Course Lackland AFB Texas  
Communications Officers School Scott Field, Illinois  
Honorably released from active Duty, August 1953  
Reserve Tour, Ground equipment Maintenance Officer  
Selfridge AFB, Michigan  
Reserve Tour, Ground Equipment Maint. Officer,  
Chanute AFB, Illinois  
Reserve Tour Aircraft Maintenance Officer  
Wright-Patterson AFB, Ohio  
Dept. of Defense Correspondence Courses in Nuclear  
Defense  
Honorable Discharge 1/Lt. USAFR 1972

MURRAY BURNSTINE 1

## ENGINEERING EMPLOYMENT

1947-1953 Undergraduate student assistant at the Wayne University Dept. of Engineering Mechanics. Assisted Messrs. Lissner, Evans, Gurdjian and Lebow in the preparation and testing of human bone to determine its properties as an engineering material. Conducted laboratory tests using photoelastic models of the human head to study the mechanisms of skull fracture and brain injury. Employed during vacation periods at the Chrysler Corp. Plymouth Division assembly plant as an assembly line worker, and at the General Motors Chevrolet Test Laboratory as Magnaflux operator and Photographer.

1953-1959 Chevrolet Test Lab. (Holbrook Ave.). General Motors Proving Ground (Milford Mich.). General Motors Research Lab. (Milwaukee Ave.) General Motors Engineering Center (Warren Mich.). Job classification during this period ranged from Laboratory Technician to Test Engineer. As laboratory Technician was assigned to the Instrumentation group; Designed, assembled, and installed instrumentation to monitor the accelerated testing of vehicle components. These tests required the use of dye penetrants, stress coatings, strain gages, accelerometers, load cells, dial indicators, thermocouples, tape recorders, still and motion picture cameras, electrical readout devices, oscillograph records and displays. Participated in the design and testing of a chassis roll (Bump and Shake) facility, and an "Indoor Proving Ground" test cell which was used to duplicate engine and transmission conditions experienced on various Proving Ground test loops. Conducted ventilation tests on models of the proposed Engineering Center to determine the rate of air exchange in the test cells. As Engineer- assigned to the Automatic Transmission Design and Development Group; Designed and assembled complex fixtures to test experimental and production transmission components and assemblies. Designed and tested the special tools and fixtures that would be required to assemble and service current and proposed transmissions.

1959-1960 Research Assistant, Dept. of NeuroSurgery, Wayne State University. Instrumented cadavers to generate intra-cranial pressures for an automotive windshield glass test program, and ran the crash tests. Designed, assembled and tested a scale with 2 gram sensitivity to weigh neuro-surgical patients for a metabolic study. Designed, built, and clinically evaluated a scanning system to localize brain tumors (thesis project). Maintained and monitored instrumentation (Nuclear Brain Probes) during neuro-surgical operative procedures at the Grace Hospital, Detroit, Michigan. Prepared and tested human bone samples under the direction of Dr. F.G. Evans at the Wayne State University and the University of Michigan Medical Schools. Tested ejection seat designs for the Air Force.

1960-1963 Assistant in Legal Medicine, Department of Legal Medicine at the Harvard Medical School. Automotive and Biomechanics Engineer on multidisciplinary research team that investigated fatal highway collisions. The project (Research on Fatal Highway Collisions) was federally funded through the U.S. Public Health Service and the National Institutes of Health. The vehicles were first examined "at the scene" when possible. The team was on 24 hour call and notification was through the Registry of Motor Vehicles, State Police, Local Police or Medical Examiners. My primary responsibilities were to inspect and disassemble the vehicles, develop methodology to separate pre-collision from collision induced failures, determine the mechanical condition and maintenance history of involved vehicles, relate injuries of victims to specific vehicle structures, do research to improve the crashworthiness of the vehicles, perform laboratory and road tests of complete vehicles or component parts, to publish the findings, and to testify in criminal trials, inquests, and hearings as an expert witness for The Commonwealth of Massachusetts. All of the field, lab, and road tests were documented. Road tests were done to demonstrate the appearance and significance of various types of tire marks. Brake and steering tests were run to demonstrate the effect on vehicle handling with systems degraded or out of adjustment. Carbon Monoxide tests were run when possible to quantify the rates of toxic buildup and fume entrance paths. Fibers, hairs, fabric, tissue, body fluids, and paint samples were collected when required. Laboratory equipment was designed and assembled to test vehicle components and systems on the vehicle and in the laboratory. An instrumented vehicle was set on fire to duplicate an actual occurrence so that the rates of temperature and gas buildup could be determined. The "vehicles" inspected during the study included passenger cars, taxicabs, trucks, trailers, semitrailers, police cars, bicycles, mopeds, motorcycles, and commercial aircraft. Investigations were conducted at the request of Governmental agencies in Massachusetts, Rhode Island, New Hampshire, and Maine. Technical assistance on accident reconstruction was given to the California Highway Patrol, Kentucky Department of Public Safety, the U.S. Air Police (MATS), and the Flight Surgeons Seminars (Harvard School of Public Health). Automobile, and tire manufacturers were notified and invited to view the evidence when design or manufacturing defects were determined to have played a causal role in a collision, or in enhancing the injuries.

1963-1966 Staff Engineer in the Division of Sponsored Research at the Massachusetts Institute of Technology, Cambridge, Massachusetts. Primary responsibilities were as design and manufacturing engineer at the Sensory Aids Evaluation and Development Center, concerned with the design, testing, improvement, and product engineering of devices and systems for the blind, deaf-blind, and multiply handicapped. A computer operated high speed Braille embossing machine was developed and turned over to the Library of Congress. A number of reading machines, which produced both speech and/or tactile displays were evaluated. Teletype machines were modified with the help of the "Telephone Pioneers" to suit the needs of the handicapped. A Braille Typewriter with a Russian Keyboard was developed for the C.I.A. Many Vocational, and mobility aids (canes, object detectors, and gyros) were developed and tested using handicapped subjects. Guest lecturer on Automotive Design, Manufacturing, and Safety to student and faculty groups at M.I.T.

1966 to Present CONSULTING ENGINEER-SELF EMPLOYED

Design and manufacturing of Medical diagnostic and research equipment (Physics Dept. Mass. General Hospital)  
Design of Sensory Aids devices (Consultant to MIT)  
Design of Aerospace and deep submergence devices  
Design of aftermarket automotive equipment  
Automotive Expert conducting investigations for State, Federal, and Municipal agencies, Attorneys, Insurance Companies, and fleet owners regarding accident reconstruction, crashworthiness, vehicle handling under emergency conditions, and the design of vehicles, vehicle components, and stationary equipment.

Expert witness in Civil and Criminal Cases.

PUBLICATIONS

1. "The Localization of Brain Tumors Based on the Detection and Resolution of Gamma Emitting Isotopes". Masters Thesis Wayne State University, College of Engineering, 1960

2. "Steering Wheel Impact". Proceedings of Symposium on Impact Acceleration Stress, Man in Space Committee, Space Science Board, National Academy of Sciences, Brooke Air Force Base 1961

3. "Deliberate Acts Leading to Collision Deaths" with Moseley, Tunny, and Segal, Harvard Medical School 1962

4. "Anatomy of a Traffic Death" with A. Moseley, M. Segal, J. Tunny, J. Dirago, and E. Moseley. Sixth annual Stapp conference. Holloman AFB New Mexico, 1962

5. "Automotive Engineering Procedures in Traffic Death Cases". Harvard Medical School, 1962

6. "Transverse Pavement Slope Measuring Device", with M. Segal, Harvard Medical School, 1963

7. "Some Defective Vehicle Conditions in Traffic Death Cases" Harvard Medical School, 1963

8. "Final Reports Sensory Aids Evaluation and Development Center" Social and Rehabilitation Services, U.S. Dept. of Health Education and Welfare. Massachusetts Institute of Technology. 1963-1970

LECTURES AT PROFESSIONAL MEETINGS

1. 5th Annual Stapp Conference University of Minnesota, 1961
2. Maine State Police Academy, Augusta Maine, 1961
3. Maine Medico-Legal Society, Augusta, Maine, 1962
4. Symposium on Impact Acceleration Stress, Brooke AFB, 1961
5. International Arson Investigators Seminar, Purdue University, 1962
6. Massachusetts Institute of Technology, Vehicle Design Course speaker, 1963
7. Massachusetts Institute of Technology, Faculty Automotive Enthusiast Group speaker, 1963
8. 6th Annual Stapp Conference, Holloman AFB, New Mexico 1962
9. Case Conference Seminars, Harvard Medical School, Department of Legal Medicine, 1960-1963
10. Flight Surgeons Seminars, Harvard School of Public Health, 1962-1963
11. Northeast regional meeting of Motor Vehicle Administrators, New York, N.Y. February 1963
12. Instructor, Commonwealth of Massachusetts Registry of Motor Vehicles Inspectors course, June 1963
13. Columbia University Teachers College of Special Education, 1965-1970
14. Boston College School of Peripatology, 1968-1970
15. Boston College School of Special Education, 1969-1970
16. San Francisco State School of Peripatology 1968-1970
17. National Engineers Week Seminar, Boston, 1973

#### RECOGNITIONS

Bausch and Lomb Honorary Science Award, 1947

Dean's List Wayne State University, College of Engineering 1960

Elected to Society of the Sigma Xi, 1960

Honorary Colonel, aide-de-camp, Kentucky, 1962

Screening Committee Judge for Metropolitan Awards for Research, National Safety Council, 1962

#### PROFESSIONAL REGISTRATION

Registered Professional Mechanical Engineer  
Michigan #11539

Registered Professional Mechanical Engineer  
Massachusetts #6788

#### MEMBERSHIP IN PROFESSIONAL SOCIETIES

Society of Automotive Engineers, Life Member grade

Society of the Sigma Xi, member at large

New England Section of SAE (MIT)

Local 9-535 Boston AFM

## Murray Burnstine Trial &amp; Deposition List

28 January 1998 Boston, Mass. Pena v Ford Motor Co. Deposition Day 3 Campbell & Edwards (Ms. Polglase)	22 January 1999 Boston, Mass. Katz v Spicer et al Deposition F.J. Macdonald (Mitch Katzman)
18 February 1998 Charlestown, Mass. Ferguson v General Motors Deposition Campbell & Edwards (Richard Campbell)	05 February 1999 Dedham, Mass. Katz v Spicer et al Civil Trial Judge Judith Fabricant
18-19 March 1998 U.S. Court Boston, Mass. Ferguson v General Motors Civil Trial Judge Young	16 April 1999 Boston, Mass. Hollis v Ford Motor VII Deposition Campbell & Edwards(Mr. Voke)
01 September 1998 Cambridge, Mass. Peters v Petco Energy Inc. Civil Trial Judge Vangestel	26 April 1999 Boston, Mass. Manning v Saturn et al. Deposition Campbell & Edwards(Ms. Polglase)
16-20 October 1998 Cambridge, Mass. Tango v. Moody and Tug et al. Civil Trial Judge Grabeau	27 April 1999 Boston, Mass. Manzello v GMC Deposition Campbell & Edwards (Ms. Polglase)
07 December 1998 Dedham, Mass. McLellan v Pina et al Civil Trial Judge Graham	12-13 May 1999 Dedham, Mass. Hoffman v Ford Motor Co. Civil Trial Judge Chernoff

## Murray Burnstine Trial &amp; Deposition List

24 June 1999

Salem, Mass.

Marsh v Hart et al

Civil Trial

Judge Welch

26 March 2002

Rochester New York

Watson v Branick Industries

Deposition

Faraci &amp; Lange Steve Swartz

05 November 1999

Exeter New Hampshire

Rose Grant v. Lincare

Deposition

Ransmeier &amp; Spellman by Mr. Smith

07,13 May 2003

U.S. Court Boston Mass.

Sliney v General Motors

Civil Trial

Judge Stearns

05-06 January 2000

U.S. Court Boston Mass.

Wesley Charest v General Motors

Civil Trial

Judge Young

07 August 2003

Exeter New Hampshire

Shaw v Marston

Deposition

David Engel/Kleinman

10 August 2000

Boston, Mass.

Estate Peters v Dodd &amp; CMI Handicap Inc.

Deposition

Peabody &amp; Arnold by Mr. Kirpalani

24 June 2004

Boston Mass.

Graham v Lapointe et al

Deposition

Keane Klein &amp; Duffey

19-24 April 2001

U.S. Court Boston Mass.

Paul Hollis v Ford Motor Co.

Civil Trial

Judge Keeton

23-25 August 2005

Suffolk Superior Court Boston Mass.

Kearsey v Siano &amp; Mackin Trucking

Civil Trial

Judge Paul Troy

20 July 2001

Weymouth Mass.

Coady v Keenan &amp; Deyeso &amp; KD Auto service

Deposition

Mr. Chester Tennyson

19 June 2006

Boston Mass.

Brown v Land Rover et al

Deposition

Fred Halstrom/John Kelleher